

PESTICIDE(M-MORTADA)

Pesticides(M.Mortada)

	Insecticides(kill insects&related speies)				Rodenticides(kill rats&mice)		Herbicides(destroy unwanted plants)	
Def	A Pesticide is a chemical used to prevent, destroy or repel pests . Pests can be Insects, Mice, Weeds, Fungi or Microorganisms such as Bacteria and Viruses.							
Types	Organophosphorus	Carbamates	Organochlorine	Naphthalene	Warfarin&long acting anticoagulant	Strychinine	Di-nitro phenol Di-nitro-ortho-cresol	Paraquat(best known herbicide)
Mode of poisoning	Generally: Accidental: eating or drinking contaminated foods. Children are common victims for rodenticides for accessibility and coloration occupational: pesticides poisoning occurs during fumigation, spraying;when farmers are not wearing protective wears. suicidal: like parathion, carbamates, other rodenticides. Homicidal: rare due to its characteristic odor.				Mostly accidental inj in children	Accidental: rodenticides containing strychnine. Suicidal: uncommon (painful death) Homicidal: never (bitter taste)	as Generally	
Route of exposure	Most compounds of pesticides are lipid soluble so most of them rapidly absorbed after exposure by different routes→ Oral,Dermal& Inhalation							
Uses	.Ops insecticides are of great significance in pest control and more used instead of organochlorine insecticides. They represent more than 80% of total insecticides used in Egypt.	Like OPs, some compounds used as rodenticides, e.g. dithiocarbamates	used in agriculture to control insects of soil & malaria. It still have veterinary uses	used as moth repellents & toilet deodorizers		Source: Strychnos nux vomica seeds	These compounds are toxic by all routes; they also are highly toxic to liver, kidney and nervous system.	
Examples	Parathion, malathion, diazinon, tetra-ethyl -pyrophosphate(TEPP) & di-isopropytfluorophosphate(DFP)	Aldicarb (highly toxic, of limited use). Baygon &sevin are moderately toxic.	DDT used to control lice but now its use is prohibited.			AP: . Strychnine . Brucine (20 times weaker)		
P/K	Strongly lipid soluble rapidly absorbed from skin, GIT&lungs.	Most of them have low dermal toxicity	Soluble in fat&absorbed from skin, GIT					
Pathophysiology	cause phosphorvlation of (AChE) at nerve endings. Loss of available AChE results in accumulation of Ach at receptor sites& effectors organ to become over stimulated by the excess Ach. This leads to Acute Cholinergic Syndrome : - Central (↑↑ followed by ↓↓) - Peripheral: 1- M (↑secreting gland & sm. ms) 2-N (↑followed by↓of autonomic ganglia &myoneural junction). **The inhibition may become irreversible after 36- 48 hours (aging process)	They are reversible ACE inhibitors by carbamylation of the enzyme. Their duration of action is relatively short.They also cant cross the BBB, so they have no central effect.	They are reversible ACE inhibitors by carbamylation of the enzyme. Their duration of action is relatively short. They also cant cross the BBB, so they have no central effect.	its metabolites cause oxidative stress with subsequent RBCs hemolysis, especially in those with in G6PD deficiency (occurs more rapidly and with smaller doses). Cell lysis →free hemoglobunemia and hemogloblinuria→RF .	# epoxide reductase →most important enzyme responsible for: 1)regenerate reduced vitK. 2) ultimately ↓synthesis of the vit K-dependent clotting factors{ II, VII, IX, X} * The binding with the reductase is essentially irreversible, indicating these compounds have a prolonged half-life in target tissue; 7-10 d for warfarin and congeners &over100 days for the2nd gen rodenticide or 'superwarfarins' such as difenacoum , brodi-facoum, & flocoumafen (it is called vit K antagonist)	* In therapeutic doses: it is an aphrodisiac & appetizer *In toxic doses: It ↓↓synaptic resist, facilitate impulse transmission in the reflex arc of spinal cord (any impulse wiil cause simultaneous ms contraction). *Inhibits the inhibitory transmitter glycine at synapse (thus diazepam is the best to control fits). *Fatal dose: 15-30mg strychnine (600 mg brucine).		concentrated inside many cells where it undergoes redox cycling, a process involving repetitive enzyme-mediated cycling between paraquat and paraquat radicals. A by-product of this process is a superoxide radical, a highly reactive O₂species, which can cause direct cellular damage or react further to form other reactive O₂ species and nitrite radicals. Redox cycling consumes NADPH, one of the cell's key antioxidant defenses. * production of free radicals(oxidative stress) and the↓ NADPH directly causes trigger pronounced 2nd inflammatory response&cell damage HOW? 1-lipid peroxidation 2-mitochondrial dysfunction 3-necrosis and apoptosis

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C/P	CNS: anxiety, restlessness,incoordination, convulsion,↓↓ resp& circulatory centers& coma. Muscarinic: STUMBLER Salivation,Tremor,Urination,Miosis; Bradycardia,Bronchorrhoea Bronchospasm,Lacrimation,Emesis,Diarrhea Nicotinic: MTWHF(days of week) Mydrrasis, Muscle twitching & cramps Tachycardia,Weakness,Hypertension Fasciculation Cause of death: Resp Failure: Central: RC depression M : Bronchospasm, bronchorrhoea N: paralysis of resp muscles	As Ops except that no central effects with mild nicotinic effects.	CNS: lead to convulsion ends in CNS depression. GI: N/V/D Liver: hepatic degenerate Respiratory: aspiration Pneumonia when mixed Withpetroleum distiliates solvents. Skin: dermal irritation on contact.	GI: N/V/D &colic. Neurological: headache, anxiety, convulsion & coma. Hematological: Hemolytic anemia Renal : dysuria, hematuria, hemoglobinuria, oliguria, RF. Hepatic: liver cell damage, few days later.	take a latency period to develop anticoagulant effects: Ecchymosis, spontaneous bleeding (gingival, epistaxis, hematuria,...)	Stage of convulsions: ★ Starts 15 min after ingestion & lasts for 1-2 min. ★Prodromal signs: restlessness, tremors, stiffness of neck &facial ms, then generalized ms Spasm (very painful). ★ Risus sardonicus (contraction of facial ms). ★Opisthotonus or high arched back (due to simultaneous contraction of extensors & flexors). ★Cyanosis (spasm of resp ms). ★Dilated pupils & ↑BL.PR Stage of relaxation: ★Lasts for about 10 min after the fit. ★ Everything returns to normal but any stimulus provokes new fit. ★Death usually occurs after 5 fits in untttpatient during attack due to asphyxia →resp ms spasm, exhaustion of the brain & RC) in-between attack due to exhaustion.	★Nausea, vomiting, sweating, fever, rapid respiration & ↑HR. ★ Increased the metabolic rate may lead to fatal hyperthermia	1 . Respiratory distress: interstitial pulmonary fibrosis 2. GIT irritation 3. Renal failure 4. Liver failure ★Possible Complication 1- ARDS 2- Holes in the esoph . 3-Inflammation of the area between the lungs (mediastinitis) 4- RF: Scarring of the lungs (pulmonary fibrosis)	
Investigations	A- Routine: LFTs, KFTS, ECG,x-ray B- Specific: AChE activity is the gold standard to confirm OPs poisoning. There are 2 forms of AChE: -True (RBCs AChE) :recovers in several days up to 4 months. -Pseudocholinesterase (plasma& liver) :more sensitive, rapid inhibit, recover in few days.	as Ops but detection of AChE activity is not reliable to confirm exposure to carbamates, as AChE spontaneously reactivate&give false -ve results.	A- Routine; Likeops.	B- Specific: Nospecific investigations	a-CBC	b-Coagulation profile: PT, PTT& INR should checked initially then after 12-24 hrs up to 48 hrs in case of long acting anticoagulant			

DD of strychnine poisoning :

	Strychnine	Tetanus
History	. Drug intake	Neglected wound
Fits	. Generalized e'periods of complete relaxation	Start in jaw ms +Tonic spasm in between fits.
Lab analysis:	Strychnine	Clostridium tetani
Ch.ch sign:	. Risus sardonicus	Lock jaw

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TTT	1- Stabilization 2- Decontamination: Skin : remove clothes and wash skin with water & soaps GIT: GL & AC 3- Supportive: suction of oral secretions 4-Antidote: Atropine: 0.5-2 mg (adults) & 0.05mg/Kg IV/10 mins till full atropinization (dry chest free of rales). Atropine should be given under good oxygenation. Oximes: they are AChE reactivators given in severe cases, should be given early in 1st 24 hours before aging of Ops.	Like Ops except oximes use is not recommended as it may aggravate toxicity of carbaryl.	1- Stabilization 2-Decontamination Skin: Likes OPs GIT: Avoid use of oils as they ↑ their absorption. 3- Symptomatic: Diazepam for seizures. Avoid use E, NE & atropine as this may aggravate myocardial toxicity 4-Antidotal: no specific antidote.	1. Stabilization. 2. Decontamination: emesis & GL accord to patient condition. 3. supportive: diazepam for seizures. 4. Urinealkalinization: NaHCO₃ to prevent Hb precipitation in renal tubules.	1. Stabilization. 2. Decontamination: -emesis & GL according to patient condition. - AC & MDAC to → # enterohepatic cycle 3. Specific treatment: a- If no bleeding, but the PT is prolonged, give vit K₁ 10-50 mg oral (2 to 4) time/day. b- For prolonged PT with less severe bleeding give vit K₁ 10 to 15 mg SC or IM c- In severe hge with prolonged PT give vit K₁ (phytomenadione) 20 mg by slow IV injection. d- In severe bleeding, give fresh frozen plasma or fresh blood.	1. Control fits by: Ether inhalation; Pentothal sodium i.v; Succinylcholine i.v followed by intubation and mech ventilation. 2. Diazepam i.v 0.05-0.1 mg/kg; repeat every 30 min (increases glycine+ wide safety margin+ less respiratory ↓↓) 3. Physiological antidote: mephenesine 0.5-1 gm i.v 4. Decontamination & supportive measures (ABCD) 5. Forced acid diuresis.	1-Stabilization. 2- Decontamination: emesis & GL with NaHCO₃ 3-symptomatic: ice baths, fluid electrolytes and O₂	no specific ttt. The goal is to relieve a) symptoms and ttt complication (supportive ttt). b) Remove all contaminated clothing: 1. skin and eye : general 2. gastric : AC 3- Removal of absorbed by hemodialysis and hemoperfusion. N.B 1. antioxidants are effective 2. hyperbaric oxygen is contraindicated
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Classification;

I- **Insecticides:** chemicals used to kill insects and related species, including : Organophosphates , Carbamates , Organochlorine & Pyrethroids

II- **Rodenticides:** chemicals used to kill rats mice, ,...including:. Zinc phosphide Warfarin, Brodifacoum , Coumarins, Dithiocarbamate, Arsenic & Strychnine

III- **Herbicides:** chemicals used to destroy unwanted plants or weeds, including: Paraquat , Diquat , Glyphosate & Chlorophenox

